MI FluFocus

Influenza Surveillance and Avian Influenza Update

Bureau of Epidemiology
Bureau of Laboratories

Michigan Department of Community Health
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New updates in this issue:

- **Michigan:** Influenza activity continues to remain below expected seasonal baselines.
- **National:** ACIP expands influenza vaccination recommendations to everyone 6 months and older, unless medically contraindicated.
- **International:** WHO recommends no change to the current pandemic influenza phase.

****2009 Influenza A (H1N1) virus Updates****

Please continue to reference the MDCH influenza website at www.michigan.gov/flu for additional 2009 H1N1 information. Local health departments can find guidance documents in the MI-HAN document library. In addition, additional laboratory-specific information is located at the Bureau of Laboratories H1N1 page at http://www.michigan.gov/mdch/0,1607,7-132-2945_5103-213906--,00.html.

****Influenza Surveillance Reports****

Michigan Disease Surveillance System: The week ending February 20th showed aggregate influenza cases and individual influenza and 2009 novel influenza cases slightly decreased from the previous week's levels. All indicators are lower than levels seen at this time last year.

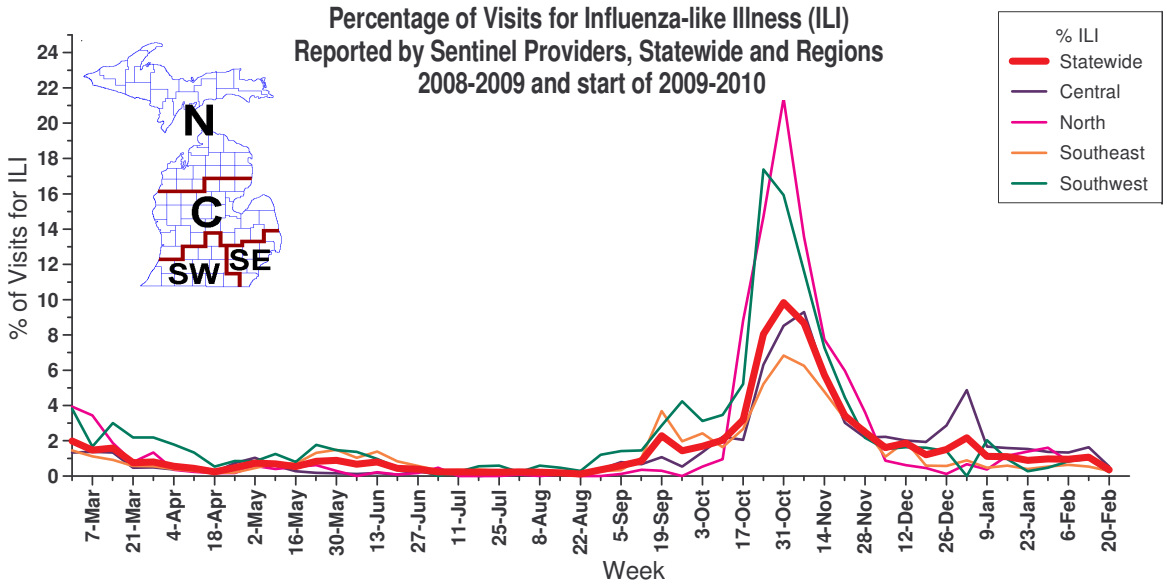
During February 14-20, 2010, 7870 cases of flu-like illness and confirmed and probable cases of seasonal and novel influenza were reported in Michigan. 2108 hospitalizations and 78 deaths associated with influenza were reported during this time (one death was removed from previous counts due to a misclassification). This report is updated every Tuesday by 5:00 pm and can be accessed at "Current H1N1 Activity" on this website: http://www.michigan.gov/h1n1flu.

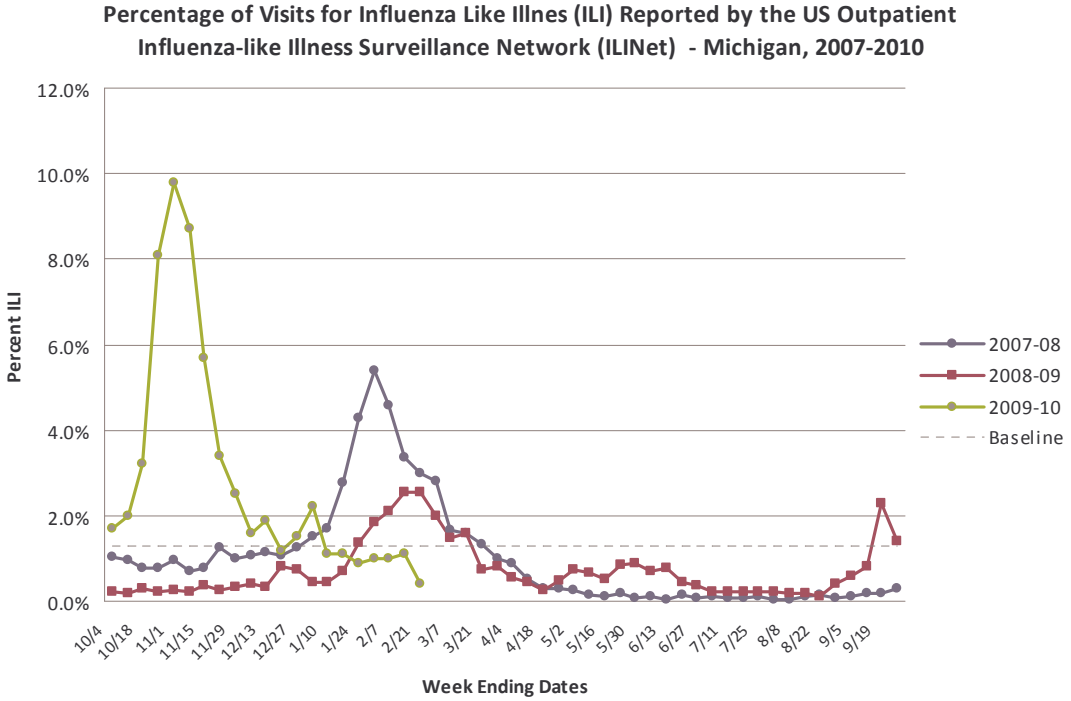
Emergency Department Surveillance: Emergency department visits from constitutional complaints remained steady near the previous week's levels, while respiratory complaints again increased slightly. Both constitutional and respiratory complaints are comparable to what was seen at this time last year. In the past week, there were four constitutional alerts in the SW (2) and N(2) Influenza Surveillance Regions and four respiratory alerts in the SE(1), C(1) and N(2) Influenza Surveillance Regions.

Over-the-Counter Product Surveillance: All indicators, except children's electrolyte sales, saw a drop in un-promoted sales near the end of the week. Over the past month, chest rubs and electrolyte sales have increased slightly. All indicators show sales similar to those seen at this time last year.

Sentinel Provider Surveillance (as of February 25): During the week ending February 20, 2010, the proportion of visits due to influenza-like illness (ILI) decreased to 0.4% overall; 28 patient visits due to ILI were reported out of 7,921 office visits. Thirty sentinel sites provided data for this report. Last year during this same time-frame, 2.0% ILI activity was reported. Activity decreased in all four surveillance regions: Southwest (0.2%), North (0.4%), Central (0.5%) and Southeast (0.3%). Please note that these rates may change as additional reports are received.

As part of pandemic influenza surveillance, CDC and MDCH highly encourage year-round participation from all sentinel providers. New practices are encouraged to join the sentinel surveillance program today! Contact Cristi Carlton at 517-335-9104 or CarltonC2@michigan.gov for more information.





Laboratory Surveillance (as of February 20): During February 14-20, MDCH Bureau of Laboratories identified no influenza isolates. For the 2009-2010 season (starting on October 4, 2009), MDCH BOL has identified 605 influenza isolates:

- 2009 Influenza A (H1N1): 604
- Influenza B: 1

14 sentinel labs reported for the week ending February 20, 2010. 2 labs reported sporadic influenza A activity (C). 1 lab reported sporadic influenza B activity (SW). 10 labs reported low or increasing RSV positives (SE, SW, C, N), 2 labs had moderately elevated RSV positives (SE, SW), and 1 lab reported highly elevated numbers of RSV positives (C).

Michigan Influenza Antigenic Characterization (as of February 25): One 2009 H1N1 influenza A virus from Michigan has undergone further characterization at the CDC. This virus was characterized as A/California/07/2009 (H1N1)-like, which is the recommended strain for the H1 component of the 2010-11 Northern Hemisphere vaccine.

Michigan Influenza Antiviral Resistance Data (as of February 25): Results are currently not available for antiviral resistance at CDC for the 2009-2010 season.

Antiviral resistance testing takes months to complete and cannot be used to guide individual patient treatment. However, CDC has made recommendations regarding the use of antivirals for treatment and prophylaxis of influenza. The guidance is available at http://www.cdc.gov/H1N1flu/recommendations.htm.

Influenza-Associated Pediatric Mortality (as of February 25): Five 2009 H1N1 influenza-associated pediatric mortalities (SE(3), SW, N) have been reported to MDCH for the 2009-2010 influenza season.

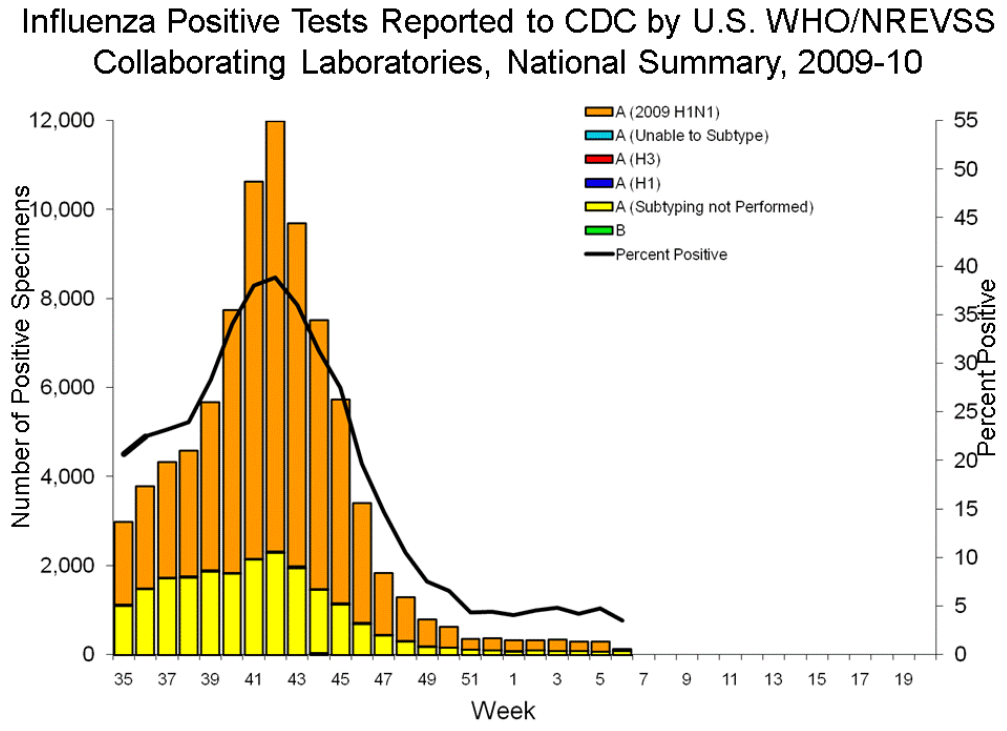
***CDC has asked states for information on any pediatric death associated with influenza. This includes not only any pediatric death (<18 years) resulting from a compatible illness with laboratory confirmation of influenza, but also any unexplained pediatric death with evidence of an infectious process. Please immediately call MDCH to ensure proper specimens are obtained. View the complete MDCH protocol online at http://www.michigan.gov/documents/mdch/ME_pediatric_influenza_guidance_v2_214270_7.pdf.

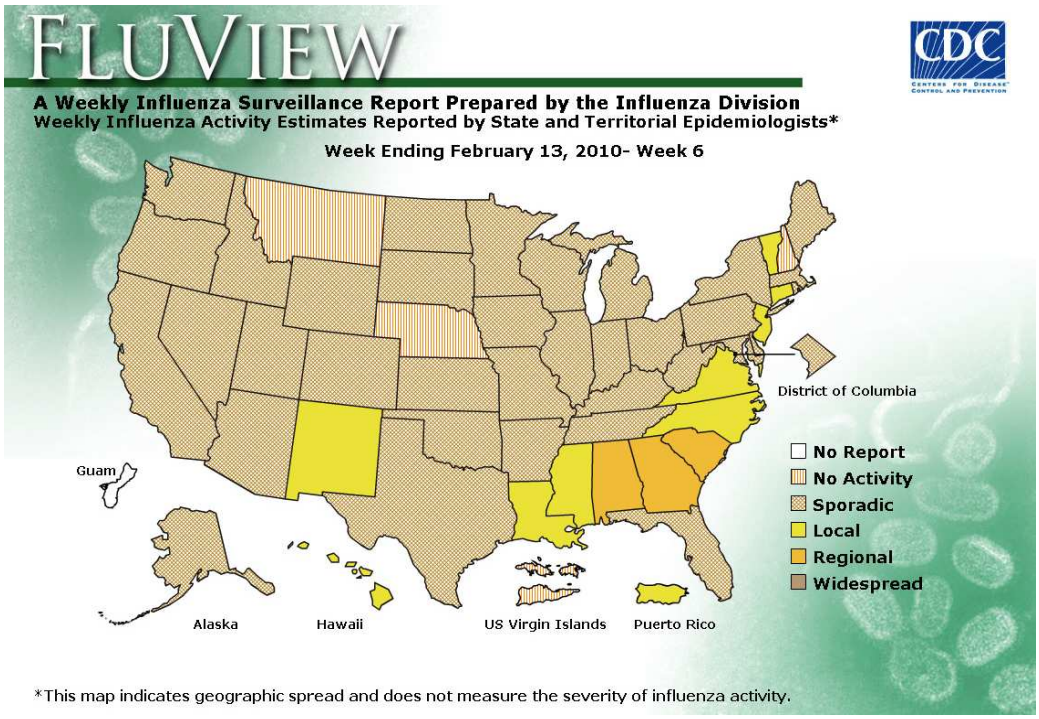
Influenza Congregate Settings Outbreaks (as of February 25): Seven congregate setting outbreaks with confirmatory novel influenza A H1N1 testing (2SE, 3 SW, 1C, 1N), and two outbreaks associated with positive influenza A tests (1C, 1N) have been reported to MDCH for the 2009-2010 influenza season. These are 8 school facilities and 1 long term care facility.

During fall 2009, 567 influenza-related school and/or district closures in Michigan (Public Health Preparedness Region 1 - 55, Region 2N - 4, Region 2S – 8, Region 3 - 54, Region 5 - 153, Region 6 - 100, Region 7 - 109, Region 8 - 84) were reported.

National (CDC [edited], February 19): During week 6 (February 7-13, 2010), influenza activity remained at approximately the same levels as last week in the U.S. 129 (3.5%) specimens tested by U.S. World Health Organization (WHO) and National Respiratory and Enteric Virus Surveillance System (NREVSS) collaborating laboratories and reported to CDC/Influenza Division were positive for influenza. All subtyped influenza A viruses reported to CDC were 2009 influenza A (H1N1) viruses. The proportion of deaths attributed to pneumonia and influenza (P&I) was below the epidemic threshold. Two influenza-associated pediatric deaths were reported. Both deaths were associated with 2009 influenza A (H1N1) virus infection. The proportion of outpatient visits for influenza-like illness (ILI) was 2.1% which is below the national baseline of 2.3%. Three of 10 regions (Regions 4, 7, and 9) reported ILI above region-specific baseline levels. No states reported widespread influenza activity, three states reported regional influenza activity, Puerto Rico and nine states reported local influenza activity, the District of Columbia and 35 states reported sporadic influenza activity, the U.S. Virgin Islands and three states reported no influenza activity, and Guam did not report.

To access the entire CDC weekly surveillance report, visit http://www.cdc.gov/flu/weekly/fluactivity.htm





From http://www.cdc.gov/h1n1flu/updates/us/#totalcases:

U.S. Influenza and Pneumonia-Associated Hospitalizations and Deaths from Aug 30, 2009–Feb 13, 2010

Cases Defined by	Hospitalizations	Deaths
Influenza Laboratory-Tests**	40,302	1,966

**States report weekly to CDC either 1) laboratory-confirmed influenza hospitalizations and deaths or 2) pneumonia and influenza syndrome-based cases of hospitalization and death resulting from all types or subtypes of influenza. Although only the laboratory confirmed cases are included in this report, CDC continues to analyze data both from laboratory confirmed and syndromic hospitalizations and deaths.

International (WHO, February 19): During weeks 1-4, pandemic influenza A (H1N1) 2009 viruses persisted in some countries around the world although the majority of Northern Hemisphere countries reported decreasing activity. The pandemic virus continued to be the predominant circulating influenza virus in all countries where influenza was reported with the exception of China where influenza B was the predominant virus. Activity in the Southern Hemisphere was variable but mainly sporadic.

Widespread outbreaks were reported in Croatia, Ecuador, Egypt, Georgia, Greece, India, Iraq, Israel, Japan, Kyrgyzstan, Mongolia, Morocco, Republic of Korea and Republic of Moldova.

Regional outbreaks were reported in the Bahamas, Bangladesh, Barbados, China, Democratic People's Republic of Korea, Dominican Republic, Jamaica, Romania, Serbia, Sudan, Tunisia, Turkey and United States of America.

Local levels of pandemic influenza A (H1N1) activity were reported in Algeria, Austria, Cambodia, Côte d'Ivoire, Estonia, Gabon, France, France - Saint Barthélemy, Paraguay, Russian Federation, Slovenia, Sweden, Switzerland and Ukraine.

Sporadic pandemic influenza A (H1N1) 2009 activity was reported in Albania, Argentina, Australia, Belarus, Belgium, Bolivia, Brazil, Bulgaria, Canada, Chile, China Hong Kong Special Administrative Region, Columbia, Costa Rica, Cyprus, Czech Republic, Denmark, El Salvador, Finland, France - French Guiana, France Guadaloupe, France - Martinique, France - Saint Martin, Germany, Hungary, Iceland, Iran, Italy, Jamaica, Latvia, Lithuania, Luxembourg, Madagascar, Malta, Mexico, Netherlands, New Zealand, Norway, Peru, Poland, Portugal, Singapore, Slovakia, Slovenia, South Africa, Spain, Thailand, United Kingdom and Venezuela.

The level of seasonal influenza activity was generally low with the exception of China where influenza B activity continued to increase. Influenza H1 and H3 was also detected at low levels in China. Sporadic seasonal influenza activity was observed in Algeria (H3), Australia (B), Cambodia (H3,B), Cameroon (H3), Canada (B), China Hong Kong Special Administrative Region (B), Democratic Republic of the Congo

(H3), Ethiopia (B), Ghana (H3,B), Indonesia (H1,H3,B), Iran (Islamic Republic of) (B), Israel (B), Japan (B), Kenya (H3,B), Mongolia (B), Morocco (B), Poland (B), Rwanda (B), Russian Federation (H1,H3,B), Senegal (H1), Singapore (H3,B), Sweden (B), Switzerland (B), Tunisia (H3), Turkey (H3), Uganda (H3,B), United Kingdom (B), United Republic of Tanzania (B) and United States (H3,B).

Angola, Azerbaijan, Central African Republic, Mozambique, Uzbekistan and Zambia reported no influenza activity.

MDCH reported **SPORADIC INFLUENZA ACTIVITY** to the CDC for the week ending February 20, 2010.

For those interested in additional influenza vaccination and education information, the MDCH *FluBytes* is available at http://www.michigan.gov/mdch/0,1607,7-132-2940_2955_22779_40563-125027--,00.html.

Novel Influenza Activity and Other News

WHO Pandemic Phase: Phase 6 – characterized by increased and sustained transmission in the general population. Human to human transmission of an animal or human-animal influenza reassortant virus has caused sustained community level outbreaks in at least two WHO regions.

National, Vaccine (MSNBC, February 24): A government panel is now recommending that virtually all Americans get a flu shot each year.

The Advisory Committee on Immunization Practices had gradually been expanding its recommendation for flu shots so that 85 percent of Americans were included.

The panel on Wednesday voted to recommend a seasonal flu vaccination for everyone except babies younger than 6 months and those with egg allergies or other unusual conditions.

The panel's recommendation now goes to the Centers for Disease Control and Prevention. The CDC usually follows the panel's advice and spreads the message to doctors and hospitals across the country.

National, Research (PLoS press release, February 22): The seasonal increase of influenza has long baffled scientists, but a new study published this week in PLoS Biology has found that seasonal changes of absolute humidity are the apparent underlying cause of these wintertime peaks. The study also found that the onset of outbreaks might be encouraged by anomalously dry weather conditions, at least in temperate regions.

Scientists have long suspected a link between humidity and seasonal (epidemic) flu outbreaks, but most of the research has focused on relative humidity – the ratio of water vapor content in the air to the saturating level, which varies with temperature. Absolute humidity quantifies the actual amount of water in the air, irrespective of temperature. Though somewhat counter-intuitive, absolute humidity is much higher in the summer. "In some areas of the country, a typical summer day can have four times as much water vapor as a typical winter day – a difference that exists both indoors and outdoors," said Jeffrey Shaman, an Oregon State University atmospheric scientist and lead author.

The researchers used 31 years of observed absolute humidity conditions to drive a mathematical model of influenza and found that the model simulations reproduced the observed seasonal cycle of influenza throughout the United States. They first examined influenza in New York, Washington, Illinois, Arizona and Florida, and found that the absolute humidity conditions in those states all produced model-simulated seasonal outbreaks of influenza that correlated well with the observed seasonal cycle of influenza within each state. Shaman and colleagues then extended their model to the rest of the continental U.S. and were able to reproduce the seasonal cycle of influenza elsewhere. They also discovered that the start of many influenza outbreaks during the winter was directly preceded by a period of weather that was drier than usual.

"This dry period is not a requirement for triggering an influenza outbreak, but it was present in 55 to 60 percent of the outbreaks we analyzed so it appears to increase the likelihood of an outbreak," said Shaman. "The virus response is almost immediate; transmission and survival rates increase and about 10 days later, the observed influenza mortality rates follow."

Though the findings by Shaman and his colleagues build a strong case for absolute humidity's role in influenza outbreaks, it does not mean you can predict where influenza will strike next. As Shaman

emphasized, "Certainly absolute humidity may affect the survival of the influenza virus, but the severity of outbreaks is also dependent upon other variables, including the type of virus and its virulence, as well as host-mediated factors such as the susceptibility of a population and rates of population mixing and person-to-person interactions."

Marc Lipsitch, a professor of epidemiology at the Harvard School of Public Health and senior author on the new study, said the new analysis may have implications for other diseases. "Seasonality of infectious diseases is one of the oldest observations in human health, but the mechanisms – especially for respiratory diseases like flu – have been unclear," Lipsitch said. "This study, in combination with Shaman and (Melvin) Kohn's earlier analysis of laboratory experiments on flu transmission, points to variation in humidity as a major cause of seasonal cycles in flu."

"Seasonal variation in flu, in turn, helps to explain variation in other infectious diseases – such as pneumococcal and meningococcal disease – as well as seasonal variation in heart attacks, strokes and other important health outcomes."

Lipsitch directs the Center for Communicable Disease Dynamics, of which Shaman is a member. This study and the center are supported by the Models of Infectious Disease Agent Study, or "MIDAS Program," of the U.S. National Institute of General Medical Sciences.

"The discovery of a link between influenza outbreaks and absolute humidity could have a major impact on the development of strategies for limiting the spread of infection," said Irene Eckstrand, who oversees the MIDAS program. "Understanding why outbreaks arise is an important first step toward containing or even preventing them, so it is essential for scientists to follow up on this intriguing connection."

The article is available online at http://biology.plosjournals.org/perlserv/?request=get-document&doi=10.1371/journal.pbio.1000316.

National, Research (Proceedings National Academy of Sciences [abstract], online February 22): Reassortment between avian H5N1 and human H3N2 influenza viruses creates hybrid viruses with substantial virulence - Chengjun Li, Masato Hatta, Chairul A. Nidom, Yukiko Muramoto, Shinji Watanabe, Gabriele Neumann, and Yoshihiro Kawaoka

The spread of avian H5N1 influenza viruses around the globe has become a worldwide public health concern. To evaluate the pathogenic potential of reassortant viruses between currently cocirculating avian H5N1 and human H3N2 influenza viruses, we generated all the 254 combinations of reassortant viruses between A/chicken/South Kalimantan/UT6028/06 (SK06, H5N1) and A/Tokyo/Ut-Sk-1/07 (Tok07, H3N2) influenza viruses by reverse genetics. We found that the presence of Tok07 PB2 protein in the ribonucleoprotein (RNP) complex allowed efficient viral RNA transcription in a minigenome assay and that RNP activity played an essential role in the viability and replicative ability of the reassortant viruses. When the pathogenicity of 75 reassortant H5 viruses was tested in mice, 22 were more pathogenic than the parental SK06 virus, and three were extremely virulent. Strikingly, all 22 of these viruses obtained their *PB2* segment from Tok07 virus. Further analysis showed that Tok07 *PB1* alone lacked the ability to enhance the pathogenicity of the reassortant viruses but could do so by cooperating with Tok07 *PB2*. Our data demonstrate that reassortment between an avian H5N1 virus with low pathogenicity in mice and a human virus could result in highly pathogenic viruses and that the human virus *PB2* segment functions in the background of an avian H5N1 virus, enhancing its virulence. Our findings highlight the importance of surveillance programs to monitor the emergence of human H5 reassortant viruses, especially those containing a *PB2* segment of human origin.

International, Avian (OIE [edited], February 23): High path avian influenza H5N1; Country: Bhutan
Date of first confirmation of the event: 22/02/2010; Date of Start of Event: 18/02/2010
Date of report: 23/02/2010; Date Submitted To OIE: 23/02/2010
Province: CHHUKHA; District: Chhukha; Sub-district: Phuntsholing; Location: Rinchending
Species: Birds; Susceptible: 500; Cases: 14; Deaths: 8; Destroyed: 28; Slaughtered: 0
Affected Population: Free-range chickens. All birds in the infected premises were culled.

Epidemiological comments: The outbreak is situated near the southern international border.
Source of the outbreak(s) or origin of infection: Unknown or inconclusive
Control Measures Applied: Stamping out, Quarantine, Movement control inside the country
To be applied: Dipping/Spraying, Screening, Disinfection of infected premises/establishment(s)
Vaccination Prohibited: Yes; Animals treated: No

International, Pandemic Phase (WHO, February 24): The Emergency Committee held its seventh meeting by teleconference on 23 February 2010. The Director-General sought the Committee's views on the determination of the pandemic status.

A detailed update was provided to the Committee on the global pandemic situation. After asking additional questions and reviewing the evidence and holding extensive discussion, the Committee was of the view that there was mixed evidence showing declining or low pandemic activity in many countries, but new community level transmission activity in West Africa. Moreover, they expressed concern that the winter months of the Southern Hemisphere had not yet started and there was uncertainty whether additional generalized waves of activity might occur and the need to not undermine preparations. The Committee advised that it was premature to conclude that all parts of the world have experienced peak transmission of the H1N1 pandemic influenza and that additional time and information was needed to provide expert advice on the status of the pandemic. The Committee accordingly suggested that the Committee be re-convened in a few weeks to review intervening developments and related epidemiological information.

Having considered these views, the current epidemiological evidence and other relevant information, the Director-General determined that there had been no change in the pandemic phase, and decided to continue to monitor the situation and developments closely and to convene the Committee again within the next several weeks.

The WHO Director-General asked the Committee for their views on continuance of the three current temporary IHR recommendations issued for the public health emergency of international concern. The consensus view of the Committee was in favor of continuation but to update the second recommendation by replacing "Intensify" with "Maintain" in recognition of the increased pandemic surveillance already implemented by countries and the need to maintain this activity. Having considered the views of the Emergency Committee, and the ongoing pandemic situation, the Director-General determined to continue the three temporary recommendations, as modified, namely:

- countries should not close borders or restrict international traffic and trade;
- maintain surveillance of unusual flu-like illness & severe pneumonia;
- if ill, it is prudent to delay travel.

Michigan Wild Bird Surveillance (USDA, as of February 25): For the 2009 testing season (April 1, 2009-March 31, 2010), HPAI subtype H5N1 has not been recovered from any of the 111 Michigan samples tested to date, including 58 live wild birds, 39 hunter-killed birds and 14 morbidity/mortality specimens. H5N1 HPAI has not been recovered from 18,219 samples tested nationwide. For more information, visit the National HPAI Early Detection Data System at http://wildlifedisease.nbii.gov/ai/.

To learn about avian influenza surveillance in Michigan wild birds or to report dead waterfowl, go to Michigan's Emerging Disease website at http://www.michigan.gov/emergingdiseases.

Please contact Susan Peters at PetersS1@Michigan.gov with any questions regarding this newsletter or to be added to the weekly electronic mailing list.

Contributors

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Table 1. H5N1 Influenza in Poultry (Outbreaks up to February 13, 2010)

(Source: http://www.oie.int/downld/AVIAN%20INFLUENZA/A_AI-Asia.htm Downloaded 2/16/10)

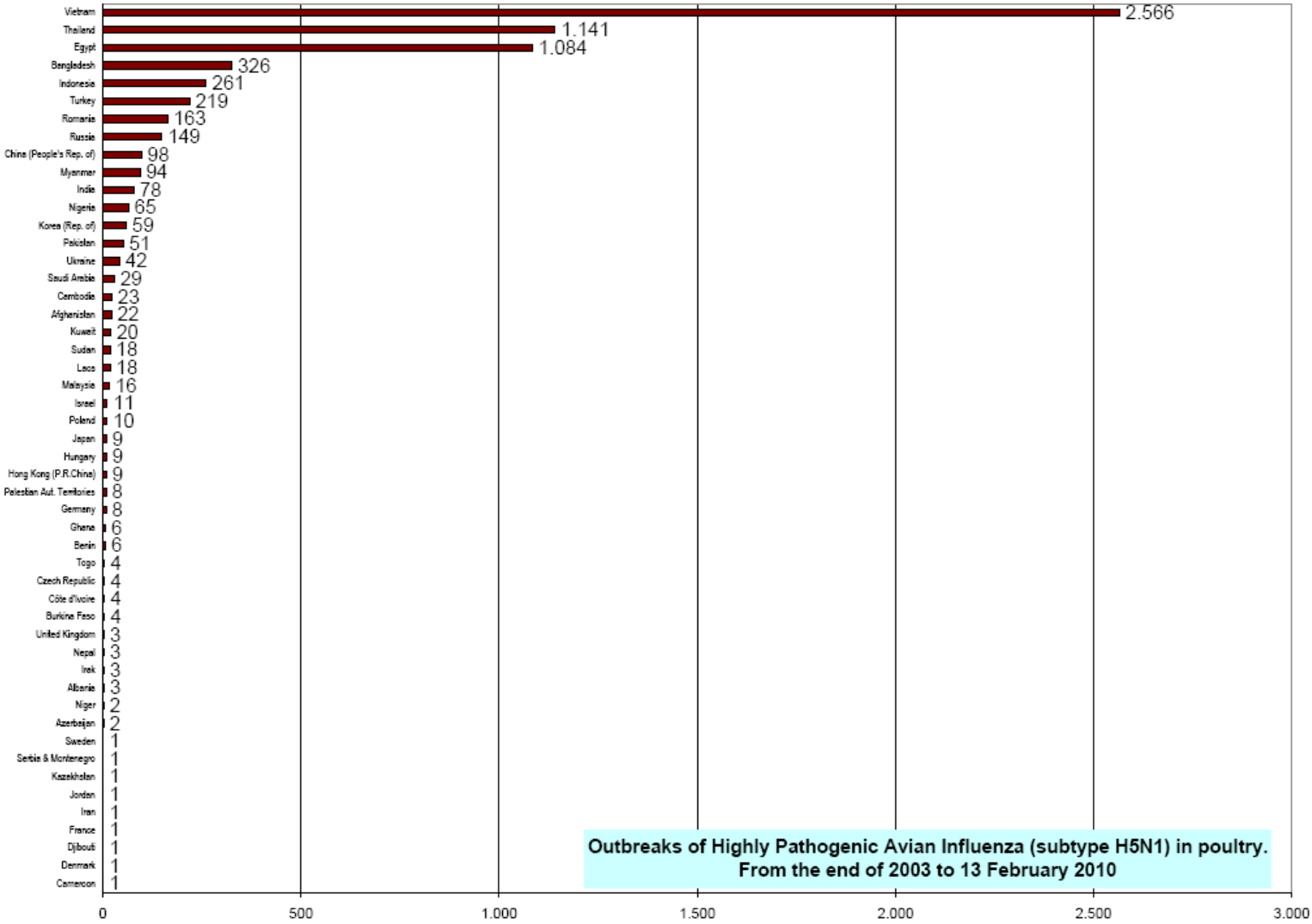

Table 2. H5N1 Influenza in Humans (Cases up to February 17, 2010)

(http://www.who.int/csr/disease/avian_influenza/country/cases_table_2010_02_17/en/index.html Downloaded 2/17/2010)

Cumulative number of lab-confirmed human cases reported to WHO. Total number of cases includes deaths.

Country	2003		2004		2005		2006		2007		2008		2009		2010		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	0	0	0	0	0	0	0	0	8	5
Bangladesh	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Cambodia	0	0	0	0	4	4	2	2	1	1	1	0	1	0	0	0	9	7
China	1	1	0	0	8	5	13	8	5	3	4	4	7	4	0	0	38	25
Djibouti	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Egypt	0	0	0	0	0	0	18	10	25	9	8	4	39	4	9	3	99	30
Indonesia	0	0	0	0	20	13	55	45	42	37	24	20	20	19	1	1	163	135
Iraq	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	3	2
Lao People's Democratic Republic	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2	2
Myanmar	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Nigeria	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1
Pakistan	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	3	1
Thailand	0	0	17	12	5	2	3	3	0	0	0	0	0	0	0	0	25	17
Turkey	0	0	0	0	0	0	12	4	0	0	0	0	0	0	0	0	12	4
Viet Nam	3	3	29	20	61	19	0	0	8	5	6	5	5	5	0	0	112	57
Total	4	4	46	32	98	43	115	79	88	59	44	33	72	32	10	4	478	286